



Bay of Fundy Lobster (LFAs 35, 36, and 38)

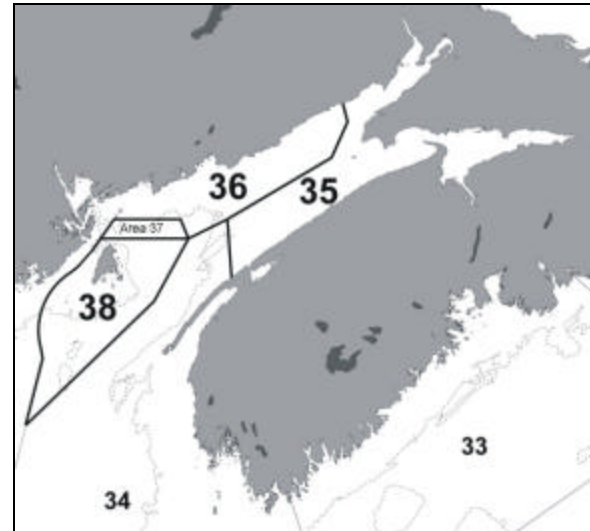
Background

A crustacean, the lobster (*Homarus americanus*) has its skeleton on the outside of its body and to grow must shed the shell, a process called molting. Very young lobsters molt 3-4 times a year, increasing 50 % in weight and 15 % in length with each molt. In the Gulf of Maine, lobsters take 8 or more years to reach legal size at 82.5 mm carapace length (CL). At that size, they weigh approximately 0.45 kg (1 lb.) and molt once a year. Larger lobsters molt less often, with a 1.4 kg (3 lb.) lobster molting every 2-3 years. The largest lobster ever reported was 20 kg (44 lb.), estimated to be 40-65 years old.

At an estimated 104 mm CL, Bay of Fundy lobsters have the largest average size at maturity across the range of the lobster, due to the colder waters they experience. The mature female mates after molting in midsummer and the following summer produces eggs that attach to the underside of the tail. The eggs are carried for 10-12 months and hatch during July and August. The larvae spend 30-60 days in the plankton, before settling to the bottom and seeking shelter. For the first 2-3 years of benthic life, lobsters remain in or near their shelter to avoid the small fish that feed on them. As they grow, and have less chance of being eaten, they move about and become catchable by lobster traps.

Lobsters are found in coastal waters from southern Labrador to Maryland, with the major fisheries in the Gulf of St. Lawrence and the Gulf of Maine. Though lobsters are most common in coastal waters, they are also found in deeper, warm water areas of the Gulf of Maine and along the outer edge of the continental shelf from near Sable Island to off North Carolina. Lobsters make seasonal migrations, moving to shallower waters in summer and deeper waters in winter. Over most of the lobster's range these movements amount to a few kilometers for most lobsters. However, in the Bay of Fundy, Gulf of Maine, offshore regions of the Scotian Shelf, and off New England, lobsters can undertake long distance migrations of 10s to 100s of km. Tagging studies have also shown that at least some of these lobster return to the same area each year.

Recently, the Gulf of Maine lobster population has become viewed as a metapopulation, meaning that there are a number of sub-populations linked in various ways by movements of larvae and adults. The number and distribution of these subpopulations remains unknown.



Summary

- Landings were stable between 1986/87 and 1993/94 (range 942 – 1046 t), then increased to 2566 t by 1998/99. Changes in participation level (particularly in LFAs 35 and 36) and exploration of new fishing grounds account for some of this increase.
- For the 1999/2000 fishing season in LFAs 35-38, 63 - 68% of lobsters landed were in the first molt group (81-94 mm CL). LFA 35-38 catches contain greater percentages of lobsters in larger molt groups (7 – 14% 110+ mm CL) than the catch in LFA 34 (4% 110+ mm CL).
- There are indications of a major recruitment pulse in the population during the 1990's. Recruitment to the upper Bay fishery peaked over the 1993-1995 period, and may now be decreasing.
- The estimate of 53% exploitation rate obtained in the 1998 assessment could not be updated. The potential for an increase in exploitation rate exists.

- New conservation measures since 1998 include an increase to 82.5 mm minimum CL in all LFAs, introduction of a voluntary v-notching program in LFA 36, and a ban on retaining v-notched lobster in adjacent LFAs.
- Given recent catch history and uncertainty over benefits of proposed conservation measures, industry has been reluctant to adopt additional minimum carapace size increases and imposition of a maximum carapace size. Industry also faces other management issues (e.g. expansion of marine aquaculture; adjacency to US fisheries, including a disputed zone).
- The short-term outlook is for landings to remain high. Over the mid-term (3-5 yr.) the Bay of Fundy lobster fisheries may experience a decline. Time series on sub-tidal benthic settlement from the lower Bay of Fundy, Maine and Rhode Island, show low settlement levels in the mid-1990's – animals expected to recruit to the fishery through the mid-2000's. It is uncertain how representative these data are of regional trends.

The Fishery

The present **management** regime is based on limited entry and effort controls that vary between LFAs:

LFA	License details	Class A (Full time)	Partnership (Full time)	Class B (Part-time)
35	Number	96	-	-
	Trap limit	300	-	90
36	Number	161	7	2
	Trap limit	300	450	90
38	Number	82	26	1
	Trap limit	375	563	113

Information as of March 31, 2001

Lobsters are trap fished in various parts of the Bay of Fundy from October 15 to July 31 of the next year:

LFA	Fall opening	Fall closure	Spring opening	Spring closure
35	Oct. 15	Dec. 31	April 1	July 31
36	2nd Tues. in Nov.	Jan 14	March 31	June 30
38	2nd Tues. in Nov.	Open through winter	Open through winter	June 30

There is a common minimum size of 82.5 mm carapace length (CL), and a prohibition on landing egg-bearing females for all LFAs. Since 1999, there has been a voluntary v-notching program in LFA 36 and, commencing in spring 2001, a prohibition on landing v-notched lobsters in all three LFAs.

Lobster **landings** in the Bay of Fundy were first reported on an annual basis in 1892. Landings peaked in 1895 at 1415 t, then subsequently declined, over a 40-year period, to a low of 179 t in 1938. From 1939 onwards, landings increased to a second peak of 897 t in 1953.

Total landings were relatively stable (between 491-897 t) from 1946/47 to 1974/75. A low of 296 t was reported in 1975/76 then landings rebounded to 545 t the following year and subsequently increased through the 1980's.

From 1986-87 to 1993-94, landings appeared to have stabilized at approximately 1000 t (range 942-1046 t). Landings subsequently increased by approximately 300t each fishing season to reach 2566 t in 1998-99. Current landings exceed the initial peak in 1892 by approx. 1000 t.

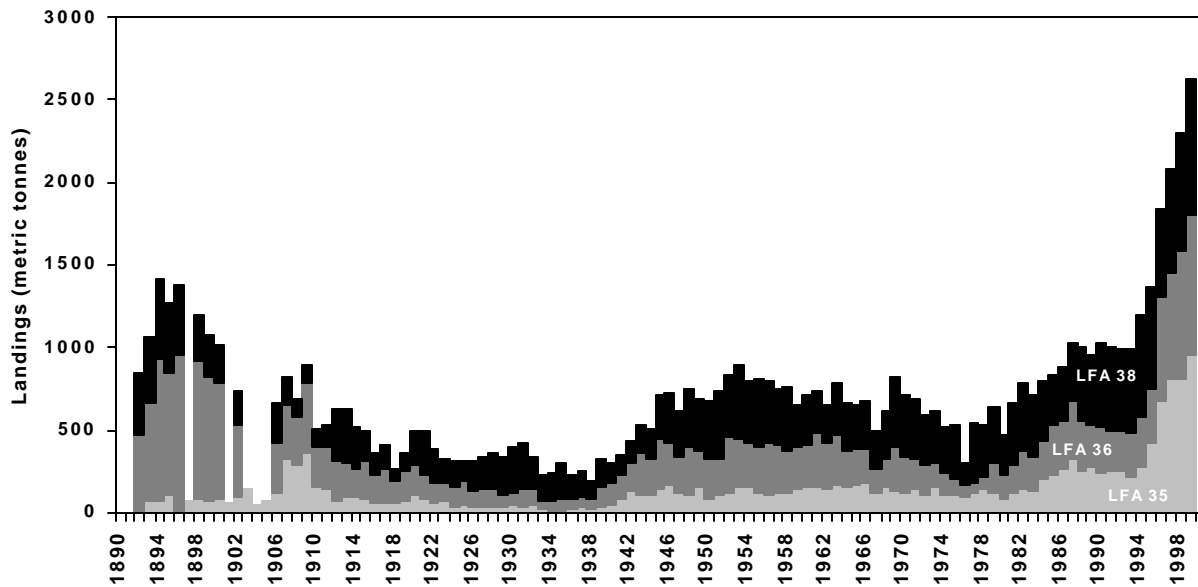
Fishing grounds have expanded over the past two decades. LFA 35 and 36 fishers

have generally extended their fishing operations several miles farther away from the coast. Some LFA 35 fishers have recently begun fishing in the vicinity of Isle Haute in the central portion of the upper bay. Since the late 1970's, a small group of LFA 38 fishers have routinely fished deep waters (to 205-m depth) at the entrance to the bay, targeting seasonal lobster migrations. During the 1990's, fishing

activity has also extended off the southern portion of LFA 38.

On a percentage basis, LFA 38 has represented approximately 50% of the total landings during most of the last 50 years, but currently each LFA contributes approximately 33% to the Bay of Fundy catch.

Annual landings (metric tonnes) for LFAs 35, 36, and 38, 1892 to 1999



Recent Fishing Season Landings (metric tonnes) in the Canadian portion of the Gulf of Maine

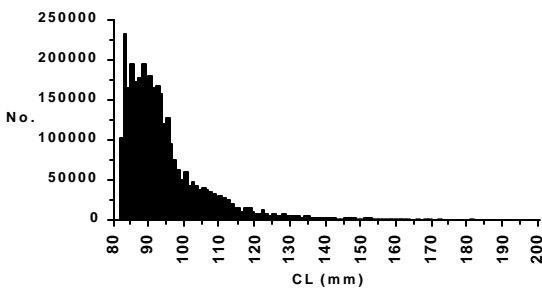
Fishing Season	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000
LFA 35	228	254	241	241	309	559	749	844	948	874
LFA 36	271	249	257	274	317	414	660	751	812	780
LFA 38	496	511	471	520	657	600	547	696	806	740
Bay of Fundy	995	1,014	969	1,035	1,283	1,573	1,956	2,291	2,566	2,394
LFA 34*	11,071	8,876	8,916	10,326	9,692	10,314	10,604	11,890	13,004	12,958
LFA 41*	713	609	544	701	718	722	670	622	585	711
Canada Gulf of Maine	12,779	10,499	10,429	12,062	11,693	12,609	13,230	14,803	16,155	16,063

*Other area landings provided for information

An analysis of **landings size structure** was undertaken for 1998/99 and 1999/00, using information from a recently expanded at-sea sampling program. The analysis for 1999/00 was based on a higher sampling rate. The approach required major assumptions on distribution of landings by weight to specific areas of the Bay of Fundy, but provided data comparable to that derived for LFA 34 and 41 (where location reporting of catch was in place during 1998/99 and 1999/00).

In LFAs 35-38, between 63 and 68% of the animals landed were in the 81-94 mm CL size range. In LFA 34, similar calculations yielded an estimate of 84% of landings from this first molt group (DFO 2001). On a percentage basis, the catch in LFAs 35-38 contains more lobsters in larger molt groups than LFA 34 (7 – 14% of 110 mm+ lobsters as compared to 4% for LFA 34).

Length frequency of landed catch in LFAs 35, 36 and 38, 1999-2000



Number (000's) of Lobster Landed per Molt Group (MG), Fishing Season 1999/00

LFA	MG 1 81-94	MG2 95-109	MG 3+ 110+	Total
35	829	394	95	1,318
36	701	253	123	1,077
38	664	171	139	975

Percent of Lobster Landed per Molt Group, Fishing Season 1999/00

LFA	81-94	95-109	110+
35	63%	30%	7%
36	65%	24%	11%
38	68%	18%	14%

Stock Structure

Some fisheries in the Bay of Fundy have traditionally been considered to rely on lobsters resulting from local settlement, as evidenced by the presence of prerecruit lobsters (shorts) in commercial traps, and the collection of small juvenile lobsters in diving surveys. Examples are southern Grand Manan, and the Fundy Isles/S.W. New Brunswick coastal area.

Other fisheries, such as the deepwater fishery off Grand Manan, depend principally on interception of mature lobsters taking part in well-defined seasonal migrations. This was also originally considered to be the case for fisheries in the upper reaches of the Bay of Fundy. However, fisheries monitoring through the 1990's has changed this perception, documenting a dramatic change in lobster size distribution in the 1990's, which suggests that local settlement and/or survival in the juvenile period has increased in this area from the mid-1980's.

Long-distance movement (> 50 nautical miles; 92.6 km) is generally restricted to large lobsters, and may involve recaptures up to 5 years following release (reviewed by Kenchington, 2000). There is clear evidence for interchange between adjacent areas in the nearshore, as well as for dispersal from nearshore and midshore release sites off southwestern Nova Scotia and in the Bay of Fundy, to offshore fishing grounds and U.S. fishing grounds.

Available data on genetic, electrophoretic, and morphometric characteristics of lobsters in the Gulf of Maine, and potential for larval exchange have also recently been reviewed (Kenchington 2000), with no firm conclusions yet being drawn on stock structure.

Resource Status

Resource status has traditionally been interpreted from **fishery dependent data**, such as trends in landings, size frequencies in the commercial catch, presence of pre-recruit lobsters in commercial trap sampling, and trends in catch rate (CPUE). For this assessment, **fishery independent data** was also used to help interpret trends in recruitment, and to undertake decadal-scale contrasts in population size distribution.

The scale of **fishery dependent** at-sea sampling has varied considerably since the program was introduced in 1978. Many locations have been sampled intermittently. Sampling rates increased over the last two fishing seasons, permitting some new spatial analyses. However, for interpretation of trends, the principal data is a 22-year time series from four locations (Seal Cove, Dipper Harbour, North Head, and Alma). These form significant local fisheries within respective LFAs, and are representative of the diverse fishery characteristics in the Bay of Fundy. Samples are generally available from the first two weeks of the fall season, and from the last two weeks of the spring season, which represent over 60% of the catch.

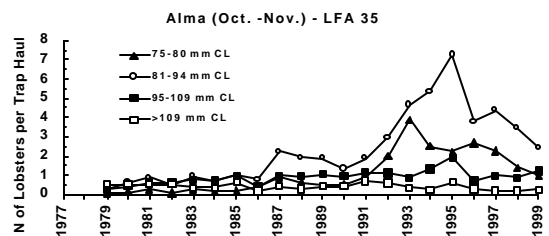
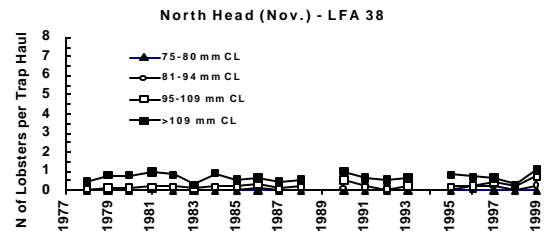
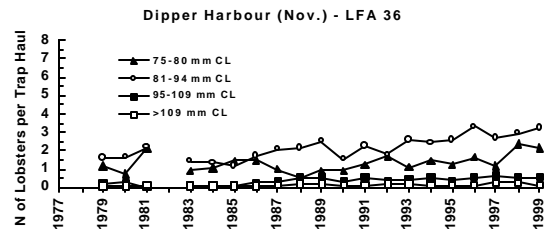
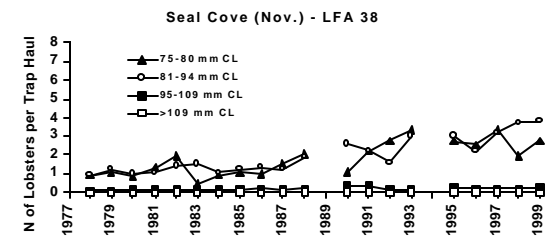
Two locations, Seal Cove in LFA 38 and Dipper Harbour in LFA 36, have traditionally been considered fisheries dependent primarily on local recruitment, as evidenced by the first molt group representing a high proportion of the catch. The other two sampling locations, North Head in LFA 38 and Alma in LFA 35, represent fisheries traditionally considered to be dependent primarily on interception of seasonal migrations of mature lobsters.

For Seal Cove, annual sampling has indicated a stable size frequency, with

average sizes ranging from 77 - 85 mm CL. Catch rates of prerecruit (75-80 mm CL) and first molt group lobsters (81-94 mm CL) show an increasing trend through the fall time series.

Fishery samples from Dipper Harbour (LFA 36) show a broader range of size classes of lobster than Seal Cove, both in pre-recruit sizes (<81mm CL), and larger lobsters beyond the first molt group. A progressive increase in pre-recruit presence is indicated for samples taken in the fall.

Catch size structures from at-sea sampling during the fall in four Bay of Fundy fishing areas



The North Head (LFA 38) fishery is similar to the midshore and offshore fisheries in LFAs 34 and 41 (in terms of fishing strategies, soak days, winter fishing period, and lobster size distribution). The average size of lobsters has ranged from 114 to 128 mm CL in fall sampling over the period 1990 to 2000. However, in recent seasons, lobster fishers have reported encountering pre-recruit lobsters in this fishery, consistent with the first observation of lobsters <80 mm CL in at-sea samples taken in fall 1996.

Off Alma, there is a strong increase in recruitment through the late 1980's/early 1990's. The mean size of lobsters sampled in Alma in fall 1990 was 93 mm CL, similar to average sizes seen in sampling conducted since 1979. There was then a downward shift in mean size of lobster in subsequent years to 86 mm CL in October 1996. There was a substantial increase in catch rate, both of pre-recruits, and the first molt group until the mid-1990's but this has declined over the last four years.

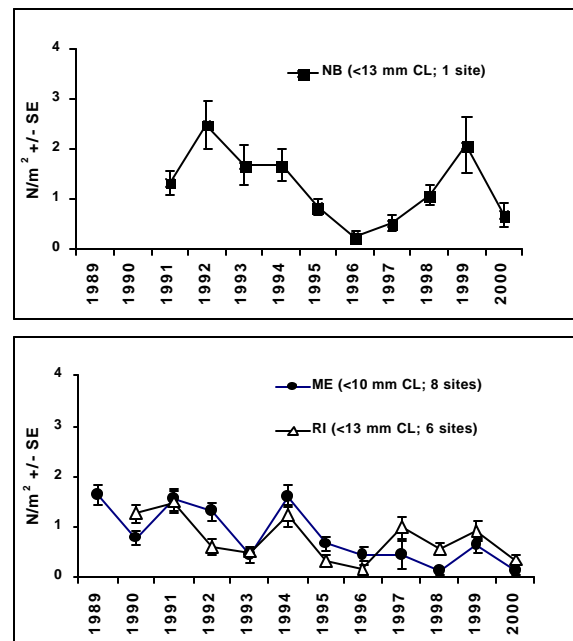
Other at-sea sampling data on the LFA 35 fishery, including sampling conducted by industry between 1997 and 2000, shows that catch rates of prerecruit lobsters off Alma are consistent with these other areas. However, the lack of comprehensive at-sea sampling through the 1990's lends uncertainty to using Alma as representative of overall recruitment trends. Nevertheless, trends in landings at the Statistical District level support the interpretation of a significant recruitment event affecting the Bay of Fundy and, in particular, upper bay fishing areas.

Fishery independent abundance estimates derived from diving studies in the Fundy Isles region (LFA 36) and a recent closed season trapping survey on Grand Manan (LFA 38) provide corroborative evidence for

recent recruitment trends seen in fishery dependent sampling. These research studies are conducted in a few locations and their use in stock assessment is exploratory.

Since 1991, an annual time series on lobster settlement (< 13 mm CL as sampled in October) has been maintained at one study site, Beaver Harbour, NB. Similar time series are available from mid-coast Maine and Rhode Island. Low abundance was observed in 1996, and also seen in the US studies. Subsequent to this, settlement densities in NB increased up to 1999, but dropped again in 2000.

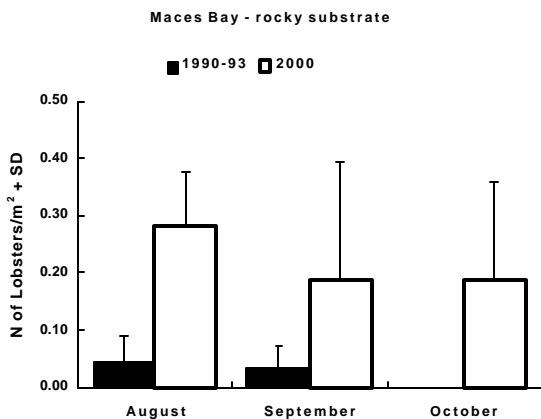
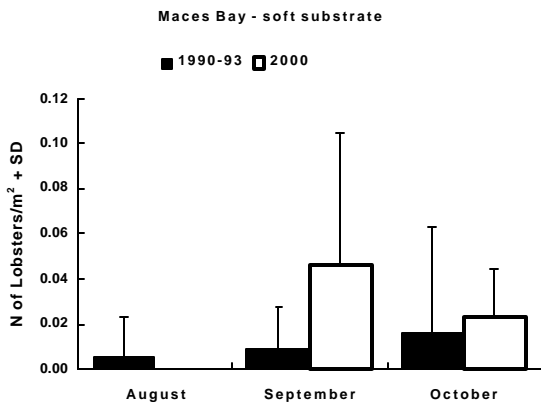
Annual settlement density at Beaver Harbour, NB, and sites in mid-coast Maine and New Hampshire



A second diving study involved sampling lobsters using transect sampling approaches. This approach samples a wider size range of lobsters than the settlement sampling. Initial studies were conducted in the Fundy Isles region from 1990-93 in order to identify sensitive lobster fishery habitats in relation to aquaculture development. A number of

sites were resampled in 2000, including Maces Bay, to provide a decadal scale comparison of lobster density on specific bottom areas. Although there was high variability in the estimates, lobster abundance in 2000 tended to be higher on both rocky and soft substrates than those recorded in the early 1990's.

Density of lobsters (7 - 142 mm CL) on rocky and soft substrates



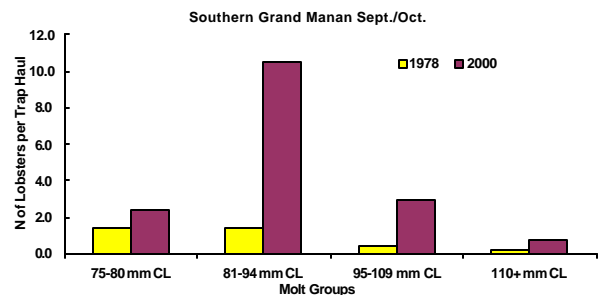
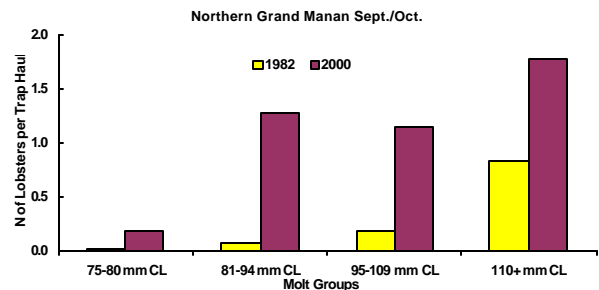
Of the lobsters sampled in the early 1990's, 25-40% were in the 20-49 mm CL size range, and 25-36% in the 50-79 mm CL size range, on a monthly basis. In 2000, higher percentages of small lobsters were encountered (61-64% lobsters 20-49 mm CL; 19-32% 50-79mm CL).

A **closed season trapping survey** was conducted on a voluntary basis by four LFA 38 fishers in September and October 2000.

Data on lobster catch rates for equivalent time periods was available from studies conducted in 1978 and 1982. Trapping in northern Grand Manan was conducted in areas known to support seasonal assemblages of large mature lobsters.

A total of 22,772 lobsters were measured out of 1669 trap hauls made during the 4-week survey. Catch rates were extremely high (compared to commercial season catch rates) with individual catches up to 40 lobsters per trap haul and 50 lb. per trap haul. Average catch rate for all sizes over the survey period was 4 lobsters per trap haul for Northern Grand Manan, and between 14 and 20 lobsters per trap haul for three fishers operating in Southern Grand Manan.

Catch rates for lobsters in closed season trapping off Grand Manan



There was a shift to higher catch rates of lobsters in the first and second molt groups (81-94; 95-109 mm CL) in 2000 compared to the historical studies. Trapping in southern Grand Manan was dominated by lobsters in the first molt group, which

reached approx. 10 per trap haul over the sampling period. Catch rates were higher in southern Grand Manan for all molt groups except the largest (110+ mm CL; lobsters in third molt group or larger).

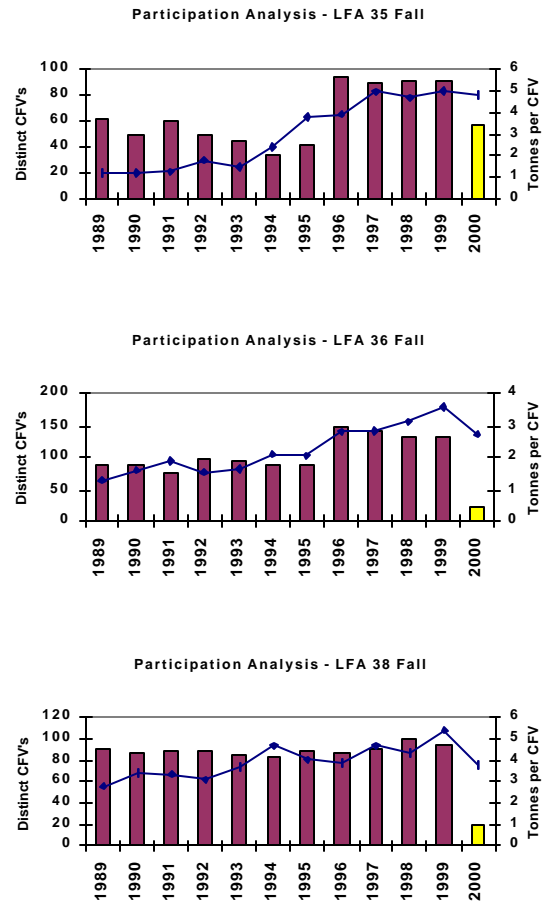
Changes in trap types and fishing strategy influence this decadal-scale contrast. However, the generally higher catch rates are consistent with industry observations of higher biomass of lobsters in these inshore areas in recent years. Industry surveys can provide important information on closed season distribution of lobsters and show promise in gaining a better understanding of the relative abundance of large mature lobsters.

Estimates of **exploitation rates** in LFAs 35-38 were presented in the 1998 assessment, using length cohort analysis (LCA). In 1998, its use was confined to 1988 - 1993 fisheries data (a stable landings period), yielding an average exploitation rate for the Bay of Fundy of 53%. Due to severe violation of the constant recruitment assumption in the mid- late 1990's, no new LCA analyses could be conducted.

There is uncertainty on how valid the 53% exploitation rate remains. Effort as measured by landings identified to distinct Canadian Fishing Vessel (CFV) number was examined on a quarterly basis from 1989 to 2000. The analysis provided the number of distinct CFV's reporting landings (histogram) and average catch per CFV per quarter (line). Results for the fall fisheries are most likely to show the combined impact of reactivation and/or transfer of licenses. Changes in participation level are most evident in LFAs 35 and 36. For all three LFAs, average catch per CFV increases over the time series. This suggests that the increase in overall effort is a response to

increased abundance; however, the potential for an increase in exploitation rate exists.

Fleet participation analysis during the fall fisheries (Oct. – Dec.), 1989-2000 *



* Data for 2000 are preliminary

Changes in exploitation rate are one of the principal factors affecting **egg production per recruit (E/R)** analyses. As E/R analyses in the 1998 assessment provided estimated benefits of conservation measures at exploitation rates of 53% and 70%, no new analyses were conducted.

Sources of Uncertainty

Regarding **landings**, major information gaps are the number of trap hauls underlying reported landings, and fishing location. The

landings reporting system changed in 1995 (from collection of sales slip information to self-reporting logbooks), and so recent landings trends may be influenced by reporting differences. Shifts in overall effort applied to lobster are related to relative performance of other fisheries, notably the scallop fishery.

Regarding **stock structure**, the degree to which the Bay of Fundy relies on adjacent areas for larval production remains unclear. Historical studies did not consider the area favorable for local larval production due to relatively cold summer water temperatures. Diving surveys and other fisheries monitoring from 1989 onwards indicate significant current levels of local benthic settlement. Based on available scientific studies, the Bay of Fundy should be considered as part of a Gulf of Maine lobster 'metapopulation'.

There is limited fishery **dependent data** on which to evaluate long-term trends, and no comprehensive time series on catch per unit of effort. Only four areas have been sampled consistently since 1978. Fishery sampling increased substantially in recent years, and a new assessment of overall catch size structure in each LFA has been made. This catch analysis used assumptions on spatial distribution of landings, as there is no fleet-wide catch location reporting system.

Regarding **fishery independent data**, the time series on lobster settlement density (as sampled in the late fall) shows depressed settlement strength in the mid-1990's, consistent with observations seen in similar diving studies in Maine and Rhode Island. However, other time series on juvenile lobster abundance, obtained from year-round intertidal monitoring in Maine, do not show a similar decline. Thus, there are conflicting trends in the currently available

time series. This underscores the need for a more comprehensive program of settlement monitoring in the Gulf of Maine area.

Regarding **exploitation rate** analysis, the LCA approach in the last assessment generated lower exploitation rate estimates than previous analytical approaches. Due to violation of the constant recruitment assumption required by LCA, no new calculations were done. The degree to which the 1998 estimate (based on 1989-1993 data) applies to the current fishery depends upon fishing effort being constant. Although fleet participation levels have increased, the consequences of this for exploitation rate increases are uncertain.

Uncertainties in the **E/R analysis** include:

1. Different assumed exploitation rate. There is uncertainty and risk, as there are greater projected benefits from some stock conservation measures. Additional runs of the model were completed in the 1998 assessment using a higher exploitation rate.
2. Appropriate magnitude of benefit for specific stock conservation measures. For a maximum size regulation, there is the potential for relocation of effort back into nearshore areas, which may reduce effectiveness. For v-notching, there is uncertainty in the definition of catchability of berried lobsters, and of realized v-notching rate, upon which E/R benefit is based.

Regarding benefits of lobster conservation plans, there is uncertainty over potential impacts of marine finfish **aquaculture** in the lower Bay of Fundy.

Management Considerations

In November 1995, the Fisheries Resource Conservation Council (FRCC) reviewed the **conservation status** of the Atlantic lobster fishery (FRCC, 1995). A new framework of seven large conservation units (Lobster Production Areas, LPAs) was proposed, within which measures should be taken to increase egg production. LFAs 35-38 fell within LPA 7 (Gulf of Maine), which the FRCC took to include LFA 34, and portions of LFA 41. A target of egg production per recruit (E/R) equivalent to 5% of that of an unfished population was recommended.

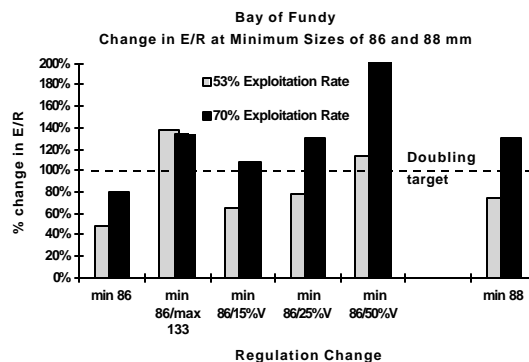
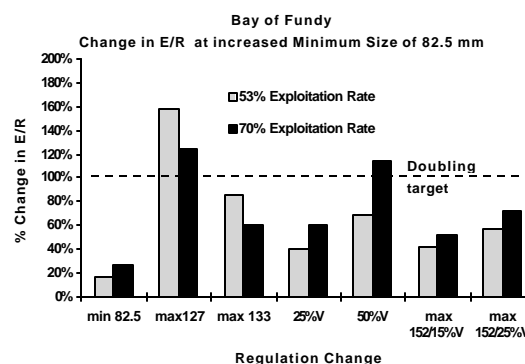
In December 1997, the Minister of Fisheries and Oceans issued a directive to Atlantic lobster fishers to implement new conservation measures, over 4 years, which would eventually lead to a doubling of E/R from existing levels.

Projected benefits of several conservation plan options are reproduced here from original E/R analyses in the 1998 stock assessment. At the starting minimum size of 81 mm CL, levels of E/R in the Bay of Fundy, at exploitation rates of 53% and 70%, were estimated to be 1.3% and 0.36% of unfished population E/R, respectively. In terms of egg numbers, the two scenarios yielded 990 and 276 eggs per recruit, respectively.

Management changes introduced to date in the doubling plan include:

Regulation change	LFA 35	LFA 36	LFA 38
Minimum size increase to 81.8 mm	Spring 1999	Fall 1999	No interim size
Minimum size increase to 82.5 mm	Spring 2000	Fall 2000	Fall 1998
V-notching program		Spring 1999	
Prohibition on landing v-notch	Spring 2001		Spring 2001

To approach a doubling of E/R at the current minimum size of 82.5 mm CL and range of exploitation rate estimates, a 50% rate of v-notching would need to be achieved. Increase in minimum size to 82.5 mm CL by itself is estimated to have provided a 17 – 28% increase. No monitoring of v-notching rates was undertaken in LFA 36. Anecdotal reports were that the program was not vigorously pursued, in part due to the lack of a prohibition on landing v-notched lobsters in adjacent LFAs until Spring 2001.



Further increases in minimum size would provide a buffer against varying levels of v-notching. Each combination of measures will lead to a loss of catch by certain sectors of the Bay of Fundy fleet, at least on an interim basis.

Subsequent to the 1998 assessment, a default conservation management plan for the Bay of Fundy proposed to introduce a maximum size on female lobsters. Industry challenged the science assessment of this conservation approach, listing as major concerns, the differential impacts it would have on fleet segments, and the potential for relocation of fishing effort in some LFAs, which would reduce its overall effectiveness.

Given recent catch history and uncertainty over benefits of other proposed conservation measures, industry has been reluctant to adopt default measures. Industry also faces other management issues (e.g. expansion of marine aquaculture; adjacency to US fisheries, including a disputed zone). Consideration of additional conservation measures and timetables for their introduction should acknowledge these industry concerns.

New spatial analyses of catch size distribution show promise in providing information on conservation management options that would be more accessible for industry than current targets based on egg production per recruit.

Outlook

The short-term outlook (1-2 yr.) for the Bay of Fundy is for landings to remain high. The current high numbers of pre-recruits in fishery sampling in the lower Bay of Fundy is a positive sign. Even if reduced recruitment is confirmed in the upper Bay,

landings could be sustained in the short term as the fishery harvests additional yield in weight from animals still surviving in the population from earlier periods of enhanced recruitment, and from new management measures such as the minimum size increase.

Over the mid-term (3-5 yr.), the Bay of Fundy lobster fisheries may experience a decline. Time series on sub-tidal benthic settlement from the lower Bay of Fundy, Maine and Rhode Island, show low settlement levels in the mid-1990's – animals expected to recruit to the fishery through the mid-2000's. Sub-tidal settlement in Maine has since remained low. There is, however, uncertainty on how representative these data are of regional trends. For instance, an intertidal lobster monitoring program in Maine does not show a similar decline. Subsequent to this low point, settlement densities in the lower Bay of Fundy increased up to 1999, but dropped again in 2000.

The historical stability of the Bay of Fundy lobster fishery, recent increase in landings, and recruitment pulse in the upper Bay need to be better understood in the context of the Gulf of Maine system before long term landings projections may be made.

For more Information:

Contact: Peter Lawton
Dept. of Fisheries and Oceans
Biological Station
531 Brandy Cove Rd.
St. Andrews, NB E5B 2L9

Tel: 506-529-5919
Fax: 506-529-5862
E-Mail:
Lawtonp@mar.dfo-mpo.gc.ca

References

DFO, 2001. Southwest Nova Scotia Lobster (LFA 34). DFO Sci. Stock Status Report. C3-62 (2001).

FRCC, 1995. A Conservation Framework for Atlantic Lobster. FRCC95.R.1. Minister of Supply and Services Canada, Cat. No. FS23-278/1995E.

Kenchington, E. [ed.]. 2000. Proceedings of the Offshore Lobster (LFA 41), Jonah Crab and Rock Crab Stock Assessments Meeting, Regional Advisory Process, Maritimes Region. DFO Can. Stock Assess. Sec. Proceed. Ser. 2000/09. 61p.

Lawton, P., Robichaud, D.A., Rangeley, R.W., and M.B. Strong. 2001. Population characteristics of American lobster, *Homarus americanus*, in the lower Bay of Fundy (Lobster Fishing Areas 36 and 38) based on fishery independent sampling. DFO Can. Stock Adv. Sec. Res. Doc. 2001/093.

Lawton, P., Robichaud, D.A., Strong, M.B., Pezzack, D.S., and C.F. Frail. 2001. Spatial and temporal trends in the American lobster, *Homarus americanus*, fishery in the Bay of Fundy (Lobster Fishing Areas 35, 36, and 38). DFO Can. Stock Adv. Sec. Res. Doc. 2001/094.

This report is available from the:

Maritime Provinces
Regional Advisory Process
Department of Fisheries and Oceans
P.O. Box 1006, Stn. B203
Dartmouth, Nova Scotia
Canada B2Y 4A2
Phone number: 902-426-7070
e-mail address: myrav@mar.dfo-mpo.gc.ca

Internet address: www.dfo-mpo.gc.ca/csas
ISSN: 1480-4913

*La version française est disponible à
l'adresse ci-dessus.*



Correct citation for this publication

DFO, 2001. Bay of Fundy Lobster (LFAs 35, 36, and 38). DFO Science Stock Status Report C3-61 (2001).